

REMARKS

The application has been amended and is believed to be in condition for allowance.

Should this case not be deemed to be in condition for allowance, an interview is requested before any further Official Action.

Claims 19-22 are new and recite further features of the invention believed patentable.

Claims 1-3, 5-8, 10-12, and 14-17 stand rejected as anticipated by WEIMER et al. (US 2002/0151107).

Claims 4, 9, 13, and 18 stand rejected as obvious over WEIMER et al.

Reconsideration and allowance of the pending claims are respectfully requested.

WEIMER does not disclose "heat treating said strontium titanate film at a temperature between 500 degrees C and 650 degrees C in an inert gas ambient". To the extent that the temperature range 500 to 650 degrees C is disclosed, there is no inert gas ambient. To the extent that there is a gas ambient disclosed, the temperature is greater than the range 500 to 650 degrees C.

See paragraph [0024] discusses the gate insulating layer 12. Paragraphs [0025-0033] discuss wet RTP processing of the gate insulating layer 12. These paragraphs do not disclose any treatment of layer 32. Nor do these paragraphs disclose heat

treating in an inert gas ambient at a temperature between 500 degrees C and 650 degrees C (as recited by each independent claim). See [0033] discloses H<sub>2</sub> and O<sub>2</sub> as the gas ambient.

Figure 5 shows lower electrode 30 formed, and insulating layer 32A formed thereon. Paragraph [0040] states that wet oxidation can be performed on layer 32A to form layer 32. This disclosure is general and no specific process parameters as to the wet oxidation of layer 32A are disclosed.

As correctly identified in the Official Action, page 2, heat treating of layer 32 is discussed in paragraphs [0041] and [0042]. Also as correctly pointed out by the Official Action, this heat treatment is used prior to or after the wet RTP treatment of layer 32.

In paragraph [0041] there is disclosed "a heat treatment ... just prior to or after performing the respective RTP wet oxidation". But again, there are no particular process parameters disclosed.

In paragraph [0042] it is disclosed that the [heat treatment] stabilizing process can be performed while the temperature in the RTP chamber is brought to the temperature for the wet oxidation. The following sentences disclose that the heat treatment stabilizing process is done at a temperature higher than the wet RTP process, e.g., greater than 750 degrees C, and the wet RTP is performed in the range of 500 to

700 degrees C. There is a follow-up high treatment at a temperature greater than about 700 degrees C.

Thus, it is clear that the temperature of 500 to 700 degrees C refers to the wet RTP process and not the before/after heat treatment process. But during temperature condition there is no inert gas ambient.

It is clear from paragraph [0042] that the heat treatment steps are before and after the wet RTP. It is further clear that the heat treatment steps are at a temperature outside the range recited by the presently pending claims.

Thus, the recitation of "heat treating said strontium titanate film at a temperature between 500 degrees C and 650 degrees C in an inert gas ambient" is not satisfied.

Reconsideration and allowance of the independent claims is therefore solicited.

As to the time period of the heat treatment, claims 4 and 9 have been amended to make clear that the heat treating step includes rapid thermal annealing conducted in the inert gas ambient for a time interval between 15 seconds and five minutes. This is not disclosed by WEIMER.

New claims 21-22 recite wherein said heat treating step includes rapid thermal annealing, at the temperature between 500 degrees C and 650 degrees C in the inert gas ambient, conducted for a time period of one minute. This is not disclosed by WEIMER.

Claim 10 has been amended to more specifically recite the invention.

WEIMER does not disclose forming a barrier metal film over a semiconductor substrate, then forming a bottom electrode on the barrier metal film, and depositing an amorphous strontium titanate film on the bottom electrode. Further, WEIMER does not disclose performing crystallization of said amorphous strontium titanate film into a single-crystal strontium titanate film by rapid thermal annealing said strontium titanate film at a temperature between 500 degrees C and 650 degrees C in an inert gas ambient.

Accordingly, claim 10 is believed patentable.

Claims 13 and 19 recite the rapid thermal annealing conducted for a time period of one minute. Claim 18 recites the rapid thermal annealing conducted for a time interval between 15 seconds and five minutes.

Claim 20 recites wherein the bottom electrode is a polycrystalline ruthenium bottom electrode.

These features are not found in WEIMER.


In summary, heat treating at a temperature between 500 degrees C and 650 degrees C in an inert gas ambient is not disclosed by WEIMER. Heat treating in an inert gas ambient is taught by WEIMER at a temperature greater than that recited. There is no teaching in WEIMER as to the time period for heat treating in an inert gas ambient.

In view of the above, applicant believes that it is clear that the pending claims are neither anticipated nor rendered obvious by WEIMER et al. Accordingly, reconsideration and allowance of all the pending claims are respectfully requested.

The Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 25-0120 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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